



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

SEP 30 2002

Ms. Allyn Turner, Director
Division of Water Resources
West Virginia Department of Environmental Protection
1201 Greenbrier Street
Charleston, West Virginia 25311


Dear Ms. Turner:

According to the Consent Decree (entered by the United States District Court for the southern District of West Virginia on July 9, 1997) and Settlement Agreement for the case OVEC Inc., et al., V. Browner, et al., the Environmental Protection Agency (EPA) has established final Total Maximum Daily Loads (TMDLs) for 205 waterbodies including the Tug Fork River and 63 tributaries, the West Fork River and 98 tributaries, Monongahela River and 37 tributaries, Dunloup Creek and one tributary, Fourpole Creek, and the Ohio River. The TMDLs are for mine-drainage impaired waterbodies in watersheds of the Tug Fork River, West Fork River, Monongahela River, Dunloup Creek, and Fourpole Creek and for polychlorinated biphenyls impairments in the Ohio River. EPA has established these TMDLs to satisfy its obligation of Joint Notice of Modification of Consent Decree to extend Deadline entered into and filed in March 1999.

In accordance with Federal regulations found in 40 CFR §130.7, a TMDL must: (1) be designed to meet water quality standards, (2) include, as appropriate, both wasteload allocations for point sources and load allocations for nonpoint sources, (3) consider the impacts of background pollutant contributions, (4) take critical stream conditions into account (the conditions when water quality is most likely to be violated), (5) consider seasonal variations, (6) include a margin of safety (which accounts for any uncertainties in the relationship between pollutant loads and instream water quality), (7) reasonable assurance that the TMDLs can be met and, (8) be subject to public participation. The decision rationales for each TMDL describe how each TMDL satisfies all statutory and regulatory requirements.

The West Virginia Department of Environmental Protection shall incorporate these TMDLs into the State's Water Quality Management Plan pursuant to 40 CFR §130.7(d)(2). As you know, any new or revised National Pollution Discharge Elimination System permits with applicable effluent limits must be consistent with the TMDL's wasteload allocation pursuant to 40 CFR §122.44(d)(1)(vii)(B)(2). Any such permit should be submitted to EPA for review consistent with EPA's letter dated October 1, 1998.

Enclosed, please find a copy of the final TMDL reports for the Tug Fork River, West Fork River, Monongahela River, Dunloup Creek, Fourpole Creek, and the Ohio River, along with EPA's decision rationales. A compact disk with these final TMDLs will be sent within the near future. These final TMDLs will also be available on our web site <http://www.epa.gov/reg3wapd/tmdl/>.

If you have any questions concerning the final TMDLs, please contact Ms. Jennifer Sincock, West Virginia TMDL Coordinator at (215) 814-5766 or Mr. Thomas Henry, TMDL Program Coordinator at (215) 814-5752.

Sincerely,

A handwritten signature in black ink, appearing to read "Jon M. Capacasa", written over a horizontal line.

Jon M. Capacasa, Acting Director
Water Protection Division

Enclosures


cc: Mr. Patrick Campbell, Assistant Director, Division of Water Resources
Ms. Ryan Alexander, Esquire
Ohio Valley Environmental Coalition
West Virginia Highlands Conservancy
Appalachian Research and Defense Fund, Inc.
Mr. David L. Yaussy, Esquire
Mr. David M. Flannery, Esquire
Mr. Jeffrey K. Towner, U.S. Fish and Wildlife Service, West Virginia

**Polychlorinated Biphenyls (PCBs)
Total Maximum Daily Loads (TMDLs)
for the Ohio River, West Virginia**

**U.S. Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103-2029**

September 2002




Jon M. Capacasa, Acting Director
Water Protection Division

9-30-02
Date

Decision Rationale
Total Maximum Daily Loads
Ohio River - River Miles 40.0 to 317.1
For PCB Affected Segment

I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those water bodies identified as impaired by the state where technology-based and other controls did not provide for attainment of water quality standards. A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources, including a margin of safety (MOS), that may be discharged to a water quality-limited water body.

This document sets forth the U.S. Environmental Protection Agency's (EPA) rationale for establishing the TMDLs for polychlorinated biphenyls (PCBs) in the Ohio River Miles 40.0 to 317.1. These TMDLs were established to address impairment of water quality, caused by undetermined sources of PCBs as identified in West Virginia's 1996 and 1998 Section 303(d) list of impaired waters.

The following regulatory requirements were considered in establishing the Ohio River TMDLs:

1. The TMDLs are designed to implement the applicable water quality standards.
2. The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.
3. The TMDLs consider the impacts of background pollutant contributions.
4. The TMDLs consider critical environmental conditions.
5. The TMDLs consider seasonal environmental variations.
6. The TMDLs include a margin of safety.
7. There is reasonable assurance that the proposed TMDLs can be met.
8. The TMDLs have been subject to public participation.

From this point forward, all references in this approval rationale are found in the TMDL Report, *Ohio River Total Maximum Daily Load for PCBs Ohio River Miles 40.0 to 317.1*

II. Summary

Based on West Virginia's 1998 Section 303(d) listing information, a PCB TMDL is to be completed for the entire length of the river for Ohio River from river mile 40.0 to 317.1. Figure 1-1 shows the study area which begins at the Pennsylvania and West Virginia border at the Ohio River Mile (ORM) 40.0 and extends downstream for 277 river miles to the border between Kentucky and West Virginia. PCBs were listed as a contaminant found in fish tissue only. The Ohio main stem is also listed for chlordane, dioxin, copper, aluminum and iron.

The TMDL is a written plan and analysis established to ensure that a waterbody will attain and maintain water quality standards. The TMDL is a scientifically-based strategy which considers current and foreseeable conditions, the best available data and accounts for uncertainty with the inclusion of a MOS value. Conditions, available data, and the understanding of the natural processes can change more than anticipated by the MOS. The option is always available to refine the TMDL for re-submittal to EPA for approval.

The following table presents the allowable load allocations at each of the sampled stream segments:

Ohio River load reductions necessary to meet water quality standards.

Sampling Location (river mile)	Existing Load (g/day)	Maximum Allowable Load (g/day)	Load Reduction (g/day)	% Reduction Necessary
ORM 40.0	229.080	2.207	226.873	99.0
ORM 129.0	148.636	2.207	146.429	98.5
ORM 175.1	152.013	2.637	149.376	98.3
ORM 207.7	146.017	2.637	143.380	98.2
ORM 264.0	144.206	2.799	141.407	98.1
ORM 281.5	125.972	3.714	122.258	97.1
ORM 302.9	110.500	3.714	106.786	96.6

III. Background

The Ohio River is 981 miles long, starting at the confluence of the Allegheny and Monongahela Rivers in Pittsburgh, PA and ending in Cairo, IL where the Ohio flows into the Mississippi River. This TMDL is for the portion of the Ohio River that begins at the Pennsylvania and West Virginia border near Chester, West Virginia at ORM 40.0, and extends downstream for 277 river miles to the border between Kentucky and West Virginia near Kenova, West Virginia, at ORM 317.1. Currently, the quality of the Ohio River and its tributaries are being negatively impacted by the persistent presence of PCBs in the environment. PCBs are not naturally occurring compounds so their presence in the environment is a result of anthropogenic activities. Main Pathways to Environment include:

- Municipal waste incinerators burning organic wastes.
- Industrial incinerators burning organic wastes.
- Poorly maintained hazardous waste sites that contain PCBs.
- Illegal or improper dumping of PCB wastes such as transformer fluids and leaks or releases from electrical transformers containing PCBs.
- Disposal of PCB-containing consumer products into municipal or other landfills not designed to handle hazardous waste.

The Ohio River Valley Water Sanitation Commission (ORSANCO) developed this TMDL report on behalf of EPA Region III. These TMDLs were established by EPA to fulfill requirements of the 1997 TMDL lawsuit settlement agreement. The 1997 consent decree requires that West Virginia, or EPA if West Virginia fails to, develop TMDLs for 44 priority waters included on West Virginia's 1996 Section 303(d) list by September 30, 2002. In addition, the consent decree required a total of 350 waters impacted by mine drainage to have TMDLs completed by March 31, 2006.

Computational Procedure

Sampling was conducted by ORSANCO as part of the Ohio River Watershed Pollutant Reduction Program to quantify current levels of PCBs in ambient air, water, sediment, and fish tissue within the TMDL study area. In addition to establishing the current concentrations present in the environment, the analytical results were reviewed to identify "hot spots" of contamination and potentially identify PCBs sources. ORSANCO utilized an innovative sampling technique referred to as high-volume water sampling to quantify ultra low-level concentrations of PCBs in the Ohio River, major tributaries and discharges. While this methodology is not yet approved by EPA, it is the only technique currently available for directly measuring ultra low levels of PCBs. Section 3.0 of the TMDL Report discusses the industrial and municipal sources of PCBs.

A high-volume water sampling event was conducted on Allegheny County Sanitary Authority's (ALCOSAN's) effluent, which is a 200 million gallon per day (MGD) sewage treatment plant located at mile 3.1, in order to quantify potential PCBs loadings from the plant. Another high-volume water sampling was conducted on the effluent of the Nitro Wastewater Treatment Plant (WWTP) located on the Kanawha River at mile 44.0. The results of this sampling suggest that these facilities directly discharge PCBs into the Ohio River. Generally, elevated levels of PCBs were detected in sediment samples taken throughout the study areas. Section 4.0 of the TMDL Report discusses sediment resuspension and atmospheric deposition of PCBs as a source for PCBs in the water column. Further studies are needed to identify the extent and rate along with additional monitoring with each tributary sub-basin to quantify atmospheric loading to the watershed. Table 5-3 presents the summary of the TMDL allocation for each location along the TMDL segment.

Section 4.0 discusses the technical approach, data sources, and TMDL calculations. Using the predicted in-stream concentrations at harmonic mean flow, PCBs loads were calculated for each sampling location (see Table 2-5). This loading exceeds the allowable load by more than two orders of magnitude. The PCB load generally decreases downstream.

IV. Discussions of Regulatory Requirements

EPA has determined that these TMDLs are consistent with statutory and regulatory requirements and EPA's policy and guidance. EPA's rationale for establishing these TMDLs is set forth according to the regulatory requirements listed below.

1. *The TMDLs are designed to implement the applicable water quality standards.*

Since the portion of the Ohio River, for which this TMDL is being established, forms the boundary between Ohio and West Virginia, water quality standards for both West Virginia and Ohio must be considered in the development of this TMDL. The water quality criteria established in ORSANCO's Pollution Control Standards also apply to the Ohio River, and must be considered in the TMDL. Table 2-1 presents the applicable PCBs water quality standards for the Ohio River in the TMDL segment.

Harmonic mean flow is specifically identified as the appropriate flow condition to best represent the averaging of hydrologic conditions over a long period of time (EPA Guidance 1991). As a result, harmonic mean flow has been selected as the hydrologic condition upon which this TMDL will be based. Also, while the West Virginia water quality standard applies to the 7Q10 low flow condition, establishing the critical condition at the harmonic mean flow is considered protective of the West Virginia standard. This is true because there is a positive correlation between stream flow and particulate phase PCBs concentrations as shown in Figure 2-1. This relationship results in not only higher concentrations at greater flow conditions, but also larger loadings as flow increases. By establishing the harmonic mean flow as the critical condition, the necessary load reductions to meet the water quality standard are significantly greater than if the TMDL was established at the 7Q10 flow. Therefore, by establishing the critical condition at the harmonic mean flow, the reductions necessary to meet the water quality standard are sufficient to ensure the standard is met for all flows equal to or less than the harmonic mean flow.

2. *The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.*

A TMDL is the total amount of a pollutant that can be assimilated by the receiving water while still achieving water quality standards. TMDLs can be expressed in terms of mass per time or by other appropriate measures. TMDLs are comprised of the sum of individual wasteload allocations (WLAs) for point sources, load allocations (LAs) for non-point sources, and natural background levels. In addition, the TMDL must include a MOS, either implicitly or explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the quality of the receiving stream. Conceptually, this definition is denoted by the following equation:

$$\text{TMDL} = \text{Sum of WLAs} + \text{Sum of LAs} + \text{MOS}$$

For purposes of this study two facilities have been identified as point sources of PCBs within the TMDL segment (Ohio River mile 40 to 317.1). These include the Texas Eastern Holbrook Compressor Station in Greene County, PA, and the Nitro WWTP in Nitro, WV. Texas Eastern Holbrook is identified as a permitted discharger with PCB limits. Table 5-1 presents the WLA for this point source. If it is confirmed that Nitro is a significant source of PCBs, then an allocation to Nitro would be considered in any future TMDL for the Kanawha River and, therefore, assigning a WLA for this facility is not necessary as part

of this TMDL. In addition, in this TMDL, the applicable water quality standard for the Ohio River also applies to five tributaries identified to directly enter the Ohio River. As such, the Nitro WWTP, which is located on the Kanawha River, one of the five identified tributaries, has the tributary allocations and percent load reductions necessary (presented in Table 5-2).

Other potential point sources of PCBs in the study area have been discussed in Section 3.2. Insufficient effluent data is available to positively identify actual sources and their loads. Additional monitoring and source identification is required. Table 5-3 presents Ohio River PCBs allocation summary.

3. *The TMDLs consider the impacts of background pollutant contributions.*

Potential loadings due to background levels of a contaminant must be considered in the TMDL development process. PCBs, however, are not naturally occurring compounds. They are created solely by anthropogenic activities and, therefore, the load allocation to background levels in the environment is set at zero g/day.

4. *The TMDLs consider critical environmental conditions.*

Because PCBs are considered carcinogenic and human health criteria for carcinogens are derived assuming a lifetime exposure, PCBs human health criteria thus apply to ambient water concentrations averaged over a human lifetime (approximately 70 years). Harmonic mean flow is specifically identified as the appropriate flow condition to best represent the averaging of hydrologic conditions over a long period of time (EPA Guidance 1991). As a result, harmonic mean flow has been selected as the hydrologic condition that this TMDL will be based on.

5. *The TMDLs consider seasonal environmental variations.*

While significant variations in concentrations of PCBs have been observed in the Ohio River, seasonality is inherently accounted for through use of the harmonic mean flow as the critical condition. Harmonic mean flow provides a representative long term average, that is consistent for use with a human health standard based on a lifetime exposure, as is the case for PCBs and all carcinogens.

6. *The TMDLs include a margin of safety.*

The CWA and Federal regulations require TMDLs to include an MOS to take into account any lack of knowledge concerning the relationship between effluent limitations and water quality. EPA's guidance suggests two approaches to satisfy the MOS requirement. First, it can be met implicitly by using conservative model assumptions to develop the allocations. Alternately, it can be met explicitly by allocating a portion of the allowable load to the MOS.

For this TMDL, the MOS is implicitly incorporated through conservative assumptions. The two areas where conservative assumptions are applied to provide an MOS are when: 1) mass is assumed to be completely conserved as it passes through the study area; and 2) the existing Ohio River and tributary loadings, and therefore necessary load reductions, are estimated using a conservative approach to ensure that the applicable water quality standard is met.

7. *There is reasonable assurance that the proposed TMDLs can be met.*

Section 6.0 addresses reasonable assurance. Due to the widespread contamination of PCBs and their persistence in the environment, no proposed remedies will provide a quick solution to the problem on the Ohio River. Initial actions need to be focused on addressing current point sources of PCBs. Limited sampling identified publicly owned treatment works as possible point sources. Similarly, while atmospheric deposition is a nonpoint source to the Ohio River, some of the contamination in the atmosphere originates from point source air emissions. The point sources to the atmosphere must be identified and possible control strategies need to be evaluated. In addition, further study is necessary before a recommended plan of action can be developed to address the sediment contamination.

In addition, the next round of National Pollutant Discharge Elimination System permitting will require that effluent limitations reflect the individual WLAs. The WLAs will be converted to permit limits using the procedures of EPA's *Technical Support Document for Water Quality-based Toxics Control* (EPA, 1991).

8. *The TMDLs have been subject to public participation.*

Public participation included an informational meeting, a 35-day public comment period, and a public hearing. A responsiveness summary is included as part of this TMDL.